Final Meeting Notes: Community Advisory Group (CAG)
Aerojet Rocketdyne Superfund Site Issues
Meeting Date: November 16, 2016

1. Introductions and Attendees

Janis Heple, CAG Chair, began the meeting with introductions.

Attendees:

- Alex MacDonald, RWQCB
- Allen Quynn, City of Rancho Cordova
- Bonnie Arthur, U.S. EPA
- Burt Hodges, SARA
- Charles O'Neill, HDR (Contractor)
- Dr. Dan Stralka, U.S. EPA
- Dan York, Sacramento Suburban Water District
- Jackie Lane, U.S. EPA
- Janis Heple, CAG Chair
- Jerald Drobesh, Community Member
- Jim Rohrer, Department of Toxic Substances Control (DTSC)
- Jimmy Spearow, Community Member
- Julie Santiago-Ocasio, U.S. EPA
- Kevin Thomas, Sacramento Suburban Water District
- Lynn Keller, U.S. EPA
- Mark Varljen, Aerojet Rocketdyne
- Paul Schubert, Golden State Water Company
- Scott Goulart, Aerojet Rocketdyne
- Stephen Green, SARA
- Tammy Teurn, HDR (Contractor)

Draft Meeting Notes from September 21, 2016

- The draft meeting notes from July 21st indicated "a statement on page 6 regarding short-term exposure to pregnancy was labeled as a question; also had concerns about the dialogue." J. Spearow indicated statement misses the point as did the minutes. The point was that the CAG disagreed with the statement by C. Fennessy that TCE is not an acute exposure issue. That statement was made and needs to be reflected there. It's just not that there's concerns with the dialogue, it's the issue that short-term exposure is an issue to Area 40. The minutes need to clarify that.
- The July 21st minutes were updated accordingly.

2. Aerojet Community Updates – Mark Varljen & Scott Goulart, Aerojet

M. Varljen and S. Goulart provided Aerojet Community Updates on behalf of C. Fennessy.

Carmichael Water District, Golden State Water Company and Aerojet Rocketdyne (Aerojet) held a ribbon cutting ceremony Oct. 24 to celebrate completion of an interconnecting 7,000 ft. pipeline crossing under the American River. The long term, three entity partnership collaborated to bring resources necessary to install the pipeline, get water from American River, treat it north of the river, and then deliver it back under the river to fulfill a long term obligation. The project will also deliver water during drought, supplying 5,000 acre feet per year to Golden State Water Company.

M. Varljen shared a map of current drilling occurring in community:

- Green locations are monitoring wells/drilling sites completed in 2016. Drill rigs were out almost every day. A monitor well in Rossmoor Bar Park (shown as proposed well MW30) near GET LB was completed two weeks ago.
- After Thanksgiving, crews will move to Marshall-Sutter (MW28) and expect to complete the well before Christmas.
- Southern locations (Grant-Hollister [MW29] & Bannister [MW27]) are scheduled for January.
- Some 2017 locations have been marked out. Aerojet wants to add monitoring points between remediation wells and supply wells.
- Deerwood Court (MW20) location is a deep monitoring well (Layer E) and an encroachment permit has been secured.
- A monitor well is planned for the Gate 5 Area of Aerojet (in auto mall, halfway between Ford and Toyota). Drill rigs will be visible from Folsom Blvd starting early 2017.
- Pending State Parks permission, Aerojet is looking to drill well near Lake Natoma. There are concerns regarding the location because State Parks plans to develop museum, but unsure of footprint. Aerojet is confident the well will be installed, but permits haven't been issued.
- Other drilling to occur in 2017, but is not planned out yet.
- Many wells near the factory outlets are not shown on the map were built in 2015; one finalized in early 2016 near the park-n-ride lot. Follow up from information received from all wells to ensure area is contained.
- Aerojet purchased new safety warning signs regarding welding flash. Signs are posted around all drilling operations. Bright welding light flashing can momentarily blind pedestrians and bicyclists. A cage was also built that drillers deploy to prevent exposure to the bright welding light.

Chemicals were found at Grant Avenue/Waynart Court
M. Varljen: The area had very low level detection. There's higher concentrations nearby so we're trying to figure out how and why it got there, and what the best way is to get it out.

Is that NDMA or other chemicals?
M. Varljen: It's NDMA only.

What's the depth there?
M. Varljen: The groundwater contamination starts at about 300 ft. but main concern is at about 450 ft.

Are monitoring points being added near the Mother Lode Circle area?
M. Varljen: It's a bit tricky finding a location to drill there. That hasn't been solved quite yet.

Have any public drinking wells have been closed?
M. Varljen: We have taken one out of service—the Chicago well for Fair Oaks Water District—but not because it was contaminated.

What GET do the two new extraction wells on site discharge their water to?
M. Varljen: They're not going into a particular GET right now. We're pilot testing wellhead treatment at the point of extraction so it hasn't been decided yet.

Where is the location of the museum that was mentioned?
M. Varljen: Between Folsom Blvd. and Lake Natoma (across from the factory outlets). Location subject to change depending on State Parks plans.

3. EPA Updates – Julie Santiago-Ocasio & Lynn Keller, EPA
Transition in EPA staff: B. Arthur will replace J. Santiago-Ocasio in late January 2017. B. Arthur is wrapping up Frontier Fertilizer Project in Davis, and will attend future CAG meetings.

4. Five-Year Review (FYR) Overview – Julie Santiago-Ocasio & Lynn Keller, EPA

- EPA completed the first Five-Year Review (FYR) for Aerojet Superfund Site in Sept. 2016
- Notice placed in newspapers announcing Five-Year Review (FYR) availability (also available on EPA's webpage)
- Prepared by: U.S. Army Corps of Engineers (USACE) & EPA; input from DTSC & RWQCB
- Focus: Evaluation of three Operable Units (OUs) that have EPA Record of Decision (ROD): Western Groundwater Operable Unit 3 (OU-3), Perimeter Groundwater Operable Unit 5 (OU-5) & Boundary Operable Unit 6 (OU-6)
- Purpose : Evaluate performance of remedies in place and their effectiveness
- Five-Year Review (FYR) Table 6-1: Most important due to summary of issues found and recommendations; also triggers reporting requirements to Congress
- EPA required to report on progression of recommendations, which is tracked on quarterly basis and sent annually to Congress

Are contaminants protruding through those areas?
J. Santiago-Ocasio: EPA and DTSC have found some data gap issues in the groundwater capture.

Are there actual data gaps?
M. Varljen: There's a combination of data gaps and uncertainty in these areas as part of the annual performance evaluation. Often times we don't have sufficient information. There are places where there are chemicals on other side of the extraction barrier, but many times it was there before the remedy began operation. Most are data gaps, they're not confirmed excursions of contaminants outside containment area.
A. MacDonald: This is nothing new, we've presented this information to the CAG over the past couple of years.
J. Santiago-Ocasio: We've definitely identified some of those as potential containment gaps and notified Aerojet. USEPA decided to add it to the Five-Year Review (FYR) so it was trackable and would be addressed.
M. Varljen: All of these issues have been acknowledged. It was largely our performance reporting and self-identification of issues that USEPA used. It acknowledges the process was working to identify areas and we've been installing monitoring wells in the community over the

last five years. We're initiated a performance evaluation process, which is pretty normal for large contamination sites. There's no expectation that the remedy is going to be perfect the first day it's put in. One needs to see how it performs and go through the performance evaluation process.

The one that really peaks my interest the most is the southern capture zone boundary near GET-K and Layer C.
M. Varljen: The northern capture zone near GET-H and the southern capture zone near GET-K butt up together. They're the same area and I believe most of this is related to the irrigation well near Haggin Park. It was drilled after the remedy was in place and deeper than the permit allowed. There's no evidence that the remedy isn't working.

Irrigation well was pulling contaminants towards it?
M. Varljen: That's what's happening. We detect contaminants in the irrigation well when the irrigation well is operated. When it's not operating during winter, contaminants aren't there.

Is this an example of what Sacramento County was attempting to avoid?
A. MacDonald: That's why we went through permitting process and regulatory agency consultation to design the irrigation well to a certain depth. The well driller decided to go deeper.

M. Varljen: J. Santiago-Ocasio stated that vapor intrusion (VI) issues were identified. Just to clarify, there have been no vapor intrusion (VI) issues identified. The Five-Year Review (FYR) did not identify there was a problem with vapor intrusion (VI), rather it pointed out that EPA has changed their evaluation procedure and therefore it'll be necessary to repeat the evaluation of whether or not vapor intrusion (VI) is an issue. The Five-Year Review (FYR) identified that the previously used procedure is no longer consistent on how EPA likes vapor intrusion (VI) evaluations to be done.

Summary mentions the land use controls (LUCs) not being put in place. It's my understanding that's DTSC's role, correct?
J. Rohrer: We have a role in signing the LUCs along with the Water Board.
S. Goulart: The land use covenants for C-29 and C-41 are all recorded now and those were the first ones that we worked with the agencies on. These are now a template for the remaining ones that are being prepared.

Water Board Perspective – Alex MacDonald, RWQCB

- In general agreement with Five-Year Review (FYR) recommendations, but there are some inaccuracies due to authors not being familiar with site history.
- Report could have been more inclusive to show more successes. Aerojet has done quite a bit of work over last decade to put these systems in-place. As M. Varljen indicated, there are potential areas where extraction wells or evaluations are needed, but the percent of containment is high.
- Vapor intrusion (VI) is good issue that needed to be brought up due to new guidance
- DTSC and the Water Board have been working on land use covenants for years starting with simple sites with no concerns which have been cleared for unrestricted use; or where

the only issue is groundwater contamination at great depths and no contaminant at levels of concern in soil. Then we'd look at other sites with soil or groundwater contamination and go to next level. LUCs are only needed prior to transferring property. DTSC and Water Board working with lawyers on the land use covenants.

Aerojet Perspective – Mark Varljen & Scott Goulart, Aerojet

- Appreciate Alex's comments; ours are similar from technical perspective. Verification process to evaluate performance and adjust remedies had already identified all groundwater containment issues. By the time the Five-Year Review (FYR) was published, many of those issues were being addressed. Once we're complete with these issues, things will change as groundwater remediation is a dynamic process due to things like drought conditions, different pumping regimes that aren't ours that cause contaminants in groundwater to move; remedies have to be manipulated and optimized.
- Aerojet agrees with technical groundwater containment issues and are committed to getting it resolved.
- A Five-Year Review (FYR) shouldn't have been performed for Operable Unit 5 (OU-5) because it is in a different state than Operable Unit 3 (OU-3). Western Groundwater Operable Unit became operational/functional over five years ago. The Perimeter Groundwater Operable Unit remedy components became operative this summer so the Five-Year Review (FYR) hasn't had an adequate opportunity to evaluate effectiveness. Full performance evaluation (or at least half of Perimeter Groundwater Operable Unit because groundwater remedy has just been turned on) hasn't been performed.
- Aerojet acknowledges the data concerns and uncertainty expressed, but remedies are just starting to operate. From that perspective, Aerojet disagrees with some factual statements. We have some opinions on technical issues (i.e. GET-K area & NDMA). There are some changed conditions that we're aware of and we have contingency plans in place. We have a RWQCB permit to ensure contaminants are treated before treated groundwater is discharged. With respect to vapor intrusion (VI), we don't know if there's a problem because there was no concern from previous evaluation methods. We're interested in looking into the best science and we'll respond diligently. With this reassessment and the change in EPA protocol, it allows us to take another approach to verify Aerojet employees and the community are protected.

Vapor intrusion (VI) Assessment Re: Five-Year Review (FYR) Recommendations – Dr. Dan Stralka, EPA

- Five-Year Review (FYR) is built into EPA's process every five years to ask questions specifically if there have been changes, what has changed and are remedies still protective. Not asking how much has been done as it's assumed it has been. It is asking did everything in the Record of Decision (ROD) get executed and is the Record of Decision (ROD) still protective. We gave it to a third party (in this case the USACE) to look at all documents and check to see if it makes sense and leads to same conclusion. One main issue is the vapor intrusion (VI) for the site. Previously they were following the 2002 EPA guidance for vapor intrusion (VI), which was more of a linear process that looked to see if there were chemical concerns.

- EPA came out with updated vapor intrusion (VI) guidance in 2015 because over the years discrepancies were discovered in modeling (empirical values measured in field at different other sites didn't match up).
- TCE toxicity value changed in 2012. Evaluation highlights concern of cardiac defects in fetus within first trimester. More concern now about early short term exposures so that's why it's a priority issue to assess vapor intrusion (VI).

What are some other public health risks due to TCE such as thyroid?
A. MacDonald: I think you're confusing TCE with the perchlorate thyroid issue.
D. Stralka: Two different levels of concern being looked at: 1) kidney cancer issues associated with long term exposure of TCE, 2) non-cancer effects (i.e. fetal heart defects and non-cancer kidney effects) associated with TCE exposure. Those are slightly higher levels of concern. It's the window of exposure and severity of the effects associated with the fetus that we're concerned about, which is why we're looking at it with a more rapid response. We no longer have our comfort window of long-term exposure (25-30 years), we're looking at a very narrow window.

Have animals (i.e. cat, dogs, etc.) been tested to see if TCE affects them?
D. Stralka: Most of the studies we have are animal studies on rodents (mice, rats, rabbits, etc.). I don't believe there have been any studies on pets, in particular.

Are the concentrations resulting in long term cancer risk only slightly above what would be found in concentrations resulting in fetal heart defects concerns?
D. Stralka: For most chemicals, you have a cancer risk range with a probability range of one in a million and one in ten thousand. For the non-cancer numbers, they're generally above, higher than this range. This is a unique case in that the non-cancer numbers actually reduces the risk management window.

What are the TCE triggers and actions?
D. Stralka: Our general protocol that we're working out with Aerojet is to go in and sample these buildings where they have the highest likelihood of vapor intrusion (VI) issues. We've seen with studying buildings and how they're built over past 20 years is that the building itself is causing problems. The way we build our buildings, they actually cause a slight negative pressure whether it's the heat, heat cycles or wind. That's causing a small negative pressure inside the building and since the fuel crisis, we seal the building tight to save energy and the building equalizes that pressure wherever it can. Generally that's sucking in gas from the subsurface into building. That's what we're trying to look at in demonstrating the building itself isn't a problem. We want to make sure vapor intrusion (VI) is not a complete pathway going into the occupied space and those concentrations are below the levels of concern based on how the building is used, the occupants and amount of time they're in there, etc.

As you were talking, I was picturing measuring inside buildings. How does it get handled when there's not a building in the area?
D. Stralka: That's a big problem that we have. It's a lower priority for us because those buildings don't exist, but still a priority because of the proposed redevelopment in all these different areas. We're essentially doing the same process -- letting you know if there's something to be concerned about, if there's an uncertainty and if there is, our general guidance is to go

after, eliminate the source and not have to rely on the building tweaks or engineering controls that would reduce any exposure. As J. Santiago pointed out, the Five-Year Review (FYR) pointed out this change and discrepancy. There weren't any indoor air samples to confirm whether there was a problem so we are going in and doing that then using that information to assess what we need to do for future buildings. We have to take that into consideration since residential buildings are operated differently from industrial buildings.

Given some of the Operable Units that are hanging out there with a lot of contamination and trying to go after the source, there's probably some capping in our future, correct?
D. Stralka: Right, that might be a long-term issue. First priority is to see if there are buildings with people in them and whether it's safe to be in those buildings based on levels of concern. If not, can we make the building safe and once it's safe, where is the contamination coming in and how do we address that. As long as the building is safe and no current exposure, it's much like groundwater where there's a potential for exposure and we want to go after it, but how quickly can we go after it. What's the most efficient way to reduce that potential? Then we have time because we don't have buildings exposed so right now we have data gaps. Do we actually have people in buildings that are exposed to concentrations above our levels of concern? That's what we'll have to assess fairly quickly to ascertain the issues.

You'll be doing indoor sampling as well as sub-slab?
D. Stralka: That's the protocol we're talking about. Best way to think of it is if you have a cloud of gas coming off the source, whether its groundwater release point, it comes off underneath the building. So we need to sample there to see if there's a pocket of gas and the potential for it coming into the building. We're also sampling inside (part of standard protocol) to ensure the chemicals we're looking for aren't being used, exposed or released in building. Protocol also looks at what was going on in building, how it's being used, and the highest likelihood of vapor intrusion (VI) issue. If we find a cloud, we look to see if under operational conditions, would it still be a problem and increase the airflow in the air conditioning system or is it sealing cracks on the floor. Verify whatever that action is actually achieves it.

Are there any house filters that would trap the vapor?
D. Stralka: Furnaces cause problems because in older homes it takes air for the combustion chambers from inside houses and the exhaust goes up chimney as heat. That actually causes larger negative pressure. That's why inside occupied space, we're looking at trying to sample during winter so heating cycles aren't on.

The question was is there a homemade filter for the HVAC system?
D. Stralka: There isn't anything efficient. It's not like a filter you put on your water. We don't know the amount of air that's flowing through so there isn't that type of technology that would work as you need to measure what's going in, what's coming out and how quickly the charcoal is being filled (not easily available for homes). A more efficient choice may be as easy as opening the window.

How soon will all of this be starting?
D. Stralka: We're in the process of trying to work out the schedule.
J. Santiago-Ocasio: There's a lot going on right now, but EPA is asking Aerojet to conduct first sampling this winter. EPA has an internal vapor intrusion (VI) Core Team that D. Stralka is on to guide us through the protocol, sample collections, work plans, action items, etc. This region in particular is in the forefront of vapor intrusion (VI) issues.

This isn't just about Operable Unit 3 (OU-3) or Operable Unit 5 (OU-5), but also areas where you might have contamination associated like Area 40 where you got concentrations of TCE in the thousands micrograms per liter that are quite high in very shallow soil or groundwater. In terms of the risks to receptors, it'd be in outdoor air particularly whether or not there could be outdoor air exposure issues. Any thoughts on that particularly on days where you don't have much air exchange or airflow in high temperature with evaporation?
D. Stralka: It's something we'll have to look at, but it's secondary because there currently aren't any buildings there. Something we have to look at and in the future development issues. The good thing is that the contamination is in subsurface so the temperature doesn't change rapidly even on a hot day, you're not seeing marked increase in volatilization. Soil temperature are pretty constant once you get past shallow soil so you wouldn't expect to see large increases in volatilization on a hot day versus a cloudy day. We'll have to look at that when we do indoor and outdoor sampling.

5. Regional Board Aerojet Cleanup Overview – Alex MacDonald, RWQCB
Note: A schedule and map were distributed.

- Purple diamonds: Proposed monitoring wells
- Purple diamonds with black dots: Monitoring wells being completed
- GET AB: All extraction wells hooked up including mass removal wells. Two sets of wells on the periphery to catch plume. Not all mass removal wells are operating at this time; some issues with ability to remove all the mass coming in with existing treatment system so Aerojet is evaluating how well that's working and how many of the mass removal wells can be pumped at one time.
- GET EF: All five air strippers installed and operating. Sprayfield wells are attached and system is fully operational. Performance evaluation reports are coming out. The ability to now have all wells operated for some period of time to see how captures are taking place is greatly enhanced.
- Regional Board sampled GET AB & EF for perfluorinated compounds, new chemical of concern. Concentrations ranging in 70-75 ppt at GET EF. Aerojet took 70 samples since then and all groundwater extraction treatment systems came back well under 70 ppt, which would be the level of concern. RWQCB concentrations were not duplicated by Aerojet's. Sum total at any one point was less than 65 ppt, so each individual perfluorinated compound when added up didn't get up to 70 ppt. More sampling will be conducted to ensure data matches Aerojet's results on a consistent basis. Aerojet sampled all systems then sent duplicated samples to two different labs and results came back the same. Performance System Report will be submitted early to mid-December 2016.
- Boeing Company: sampled extraction well for perfluorinated compound. Boeing received results and highest was 3 ppt at trace level.

- Mather Air Field: Has history of use of perfluorinated compounds and actually found it in the Air Force's extraction system with over 100 ppt.
- Aspen Grove Mobile Home Park: Sits on edge of plume and perchlorate was detected in its water supply well. Aerojet took the information and asked if they would like to be hooked up to California American Water supply, which they agreed to. Aerojet finishing engineering and the bid package will go out in December 2016.
- White Rock GET: Two extraction wells completed. Working on a pipeline to take water back to GET AB by spring 2017.

Is California American Water still handling the Chettenham well?
A. MacDonald: That well had 90 ppb of perchlorate with a treatment system on it. Over time concentration dropped down to non-detect. Aerojet took the treatment system off the well and paid for a replacement water supply. The well is not being operated and they took it out of their permit.

Are they going to destroy it?
A. MacDonald: Not sure, but under water regulations they're required to destroy water wells that are not being used.

- GET KA: Well 2082 has NDMA in it periodically and Regional Board staff and Aerojet have met with Cordova Park and Recreation Department (owners of the well) twice. The water supply well was not constructed properly. Aerojet is paying to put water meter on the well. Last two samples in early 2016 were non-detect, which is when concentrations are usually highest. In June, Aerojet requested modifications to pumping schedule to split into zones instead of pumping as high of a rate for three days. Unsure if schedule was changed due to their lack of recordkeeping.
- Area 4900: Soil vapor extraction system operating at full capacity for a year. Concentrations have tapered off. Now looking at how long to operate wells until concentrations fully diminish. There's a point in diminishing return where it'll cost more to remove a small mass. That's what will be evaluated. If they can turn it off, the treatment system is portable so they can pick it up and move to another site. Finished land use covenants and recorded those.
- 4670: Well has been around a long time, but hasn't been pumped for quite some time. The hog out facility plume comes down towards 4670 so well was turned on to see how much mass it can get out it. First concentration before turned on was 10-20 ppb; after started pumping it was 50,000 ppb. Huge concentrations getting up to GET AB where there's ion exchange for removal of perchlorate. Aerojet placed temporary pipeline above ground connecting to treatment system at GET EF (biological system for treatment of perchlorate), which is now removing a huge amount of mass—over 8,000lbs per month. A good well so evaluating other nearby areas to potentially place a well to capture additional mass.
- IRCTS: County is trying to sell property southeast of the runway and was courting a battery manufacturer (ended up in Nevada). Didn't want to add another well to area as there might be potential buyer in the future.

For the wells that are discharging surface water, is AC-23 one of them?
A. MacDonald: AC-23 and AC-18 are wellhead treatment systems that serve water to the public.

I thought there was one well near Morrison Creek in Rancho Cordova right around AC-23 and notice there was a periodic discharge into the channel. Is the one near Cordova Creek discharging there?
A. MacDonald: GET K discharges into the channel and goes past Soil Born Farms.

Is there a similar one down elsewhere?
A. MacDonald: There are three treatment plants on water supply wells that discharge periodically to surface water – AC-6, AC-18 and AC-23. The discharge would end up going to a canal to the American River.

Right, for those discharging into the surface water, do you have a permit to do that?
A. MacDonald: Yes, Aerojet has an NPDES permit. I believe we have 11-12 treatment plants on it including three water supply wells that Golden State Water Company operates.

I'm not sure what kind of permit it would be, but how about permission to be able to discharge flow into the channel because you're taking capacity?
A. MacDonald: Correct, they have to obtain permits from the Sacramento County Flood Control District that handles that.

Are there operational parameters in the event it rains?
A. MacDonald: They get a call and have to turn the plant off in certain amounts of rain. Only generally happens once or twice a year. Required to turn off when directed by Sacramento County Flood Control District.

6. Next Meeting Date

- Wednesday, January 18, 2017 (City Hall, American River South Room)